CLAIMS

1. A method for producing a liquid crystal optical element, which comprises sandwiching a mixture of a liquid crystal with an uncured curable compound between a pair of substrates which are provided with transparent electrodes and of which at least one is transparent, and curing the curable compound to form a liquid crystal/cured composite layer, wherein the curable compound contains a compound of the formula (1):

$$A_1\text{-}(OR_1)_n\text{-}O\text{-}Z\text{-}O\text{-}(R_2O)_m\text{-}A_2 \quad \text{Formula (1)}$$

wherein each of A_1 and A_2 which are independent of each other, is an acryloyl group, a methacryloyl group, a glycidyl group or an allyl group; each of R_1 and R_2 which are independent of each other, is a $C_{2\text{-}6}$ alkylene group; Z is a bivalent mesogen structure; and each of n and m which are independent of each other, is an integer of from 1 to 10.

2. The method for producing a liquid crystal optical element according to Claim 1, wherein Z is a 4,4'-biphenylene group, or a 4,4'-biphenylene group having part or all of hydrogen substituted by $C_{1\text{-}2}$ alkyl or halogen atoms.

3. The method for producing a liquid crystal optical element according to Claim 1 or 2, wherein each of R_1 and R_2 which are independent of each other, is an ethylene group or a propylene group.

4. The method for producing a liquid crystal optical

element according to Claim 1, 2 or 3, wherein each of A_1 and A_2 which are independent of each other, is an acryloyl group or a methacryloyl group.

5. The method for producing a liquid crystal optical element according to Claim 1, 2, 3 or 4, wherein each of n and m which are independent of each other, is from 1 to 4.

6. The method for producing a liquid crystal optical element, wherein the curable compound contains two types of curable compounds, of which the molecular weights are different by at least two times.

7. The method for producing a liquid crystal optical element according to Claim 6, wherein the curable compound contains a curable compound containing a mesogen structural portion in its molecule and a curable compound containing no mesogen structural portion.

8. The method for producing a liquid crystal optical element according to Claim 6 or 7, wherein the two types of curable compounds have curable sites connectable to each other.

9. The method for producing a liquid crystal optical element according to Claim 6, 7 or 8, which contains a curable compound having a molecular weight of at least 1,000.

10. The method for producing a liquid crystal optical element according to any one of Claims 1 to 9, wherein the mixture contains a chiral agent.

11. The method for producing a liquid crystal optical element according to any one of Claims 1 to 9, wherein the mixture contains a chiral agent, and the helical pitch of the chiral agent is at least 4 μm and at most three times of the electrode gap.

12. The method for producing a liquid crystal optical element according to Claim 11, wherein the electrode gap is from 4 to 50 μm.

13. The method for producing a liquid crystal optical element according to Claim 11 or 12, wherein the helical pitch is at least 5 μm and at most two times of the electrode gap.

14. The method for producing a liquid crystal optical element according to any one of Claims 1 to 13, wherein the mixture contains a very small amount of a curing catalyst.

15. The method for producing a liquid crystal optical element according to any one of Claims 1 to 14, wherein a plurality of compounds of the formula (1) wherein n and m are different, are used in combination.

16. A liquid crystal optical element produced by the method as defined in any one of Claims 1 to 15.